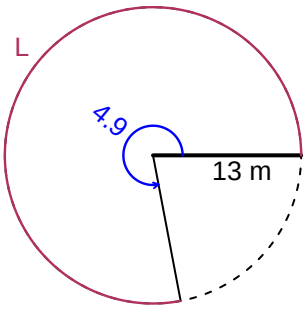
Name: Date:

Trig Final (SLTN v622)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 13 meters. The angle measure is 4.9 radians. How long is the arc in meters?

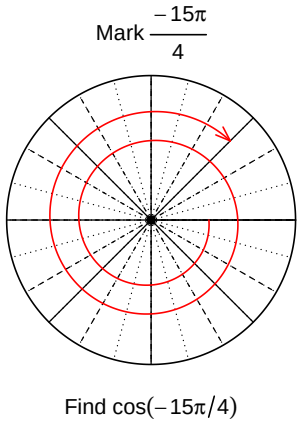


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

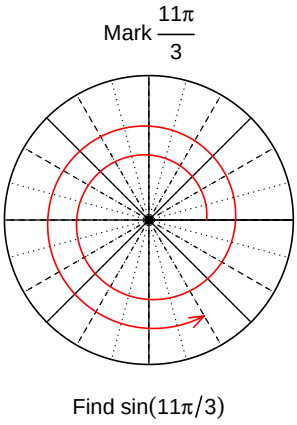
$L = 63.7$ meters.

Question 2

Consider angles $\frac{-15\pi}{4}$ and $\frac{11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-15\pi}{4}\right)$ and $\sin\left(\frac{11\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\cos(-15\pi/4)$



Find $\sin(11\pi/3)$

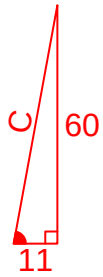
$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(11\pi/3) = \frac{-\sqrt{3}}{2}$

Question 3

If $\tan(\theta) = \frac{-60}{11}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

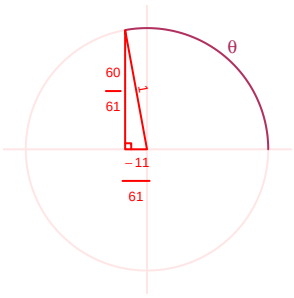
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$11^2 + 60^2 = C^2$$
$$C = \sqrt{11^2 + 60^2}$$
$$C = 61$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{60}{61}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 4.07 Hz, an amplitude of 6.06 meters, and a midline at $y = 2.84$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.06\sin(2\pi 4.07t) + 2.84$$

or

$$y = 6.06\sin(8.14\pi t) + 2.84$$

or

$$y = 6.06\sin(25.57t) + 2.84$$